UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,966	07/03/2003	Mahesh Ajgaonkar	SP02-155	5753

22928 7590 01/05/2007
CORNING INCORPORATED
SP-TI-3-1
CORNING, NY 14831

EXAMINER	
GARCIA, LUIS	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/613,966	AJGAONKAR ET AL.	
	Examiner	Art Unit	
	Luis F. Garcia	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 20-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 20-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-17 and 20-27 are pending instant application.

Claim Objections

2. Claims 20 and 21 objected to because of the following informalities: dependent on cancelled claim 18, hereinafter claims 20 and 21 are taken to be dependent on independent claim 17. Appropriate correction is required.

Response to Arguments

3. Applicant's arguments with respect to claims 1,11,17 and 26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1-17 and 23-27 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Tager et al (US 2004/0208608) in view of Mukasa (US 2002/0012509) in further view of Hayee et al (IEEE Photonics Technology Letters Vol. 9, NO. 9); Tager et al hereinafter referred to as Tager and Hayee et al hereinafter referred to as Hayee. NOTE: Prior art reference Hayee will be referenced by +column and paragraph number (e.g. total of six columns and 9 paragraphs)).

Claims 1-16 addressed below.

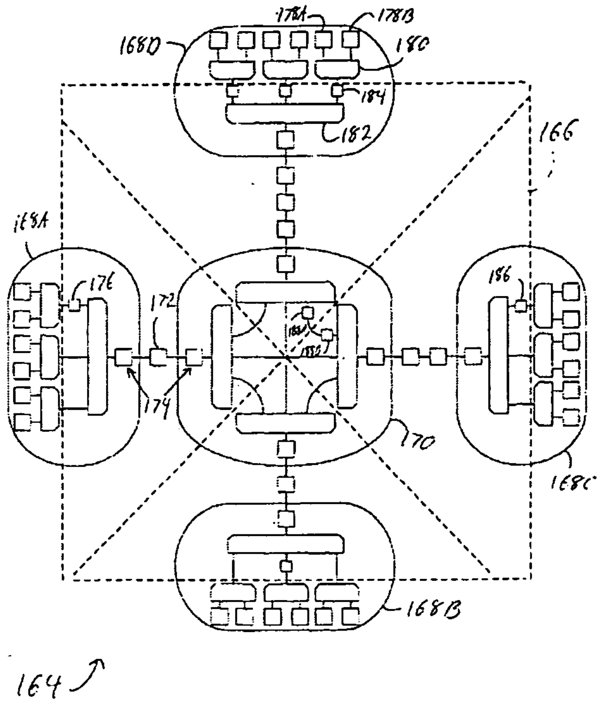


FIG. 15

Tager FIG. 15

<u>Regarding claim 17</u>, Tager discloses an optical communications system comprising:

an optical signal source capable of generating a plurality of signals at a plurality of wavelengths , including first and second signals **(FIG. 15. (Transponders-178A, 178B) and ¶0050 in which the transponders generate individual wavelengths for transmission (plurality of signals at a plurality of wavelengths))**;

a plurality of nodes including first, second and third nodes **(FIG. 15 (168A,B,C,D: transmitting/receiving nodes) and ¶0050)**;

a plurality of optical fiber links including:

interconnecting links that optically interconnect the plurality of nodes **(FIG. 15 in which the optical nodes (168A-D) are interconnected via a plurality of fibers)**; and

external branch links, each external branch link optically connected to at least one of the nodes, including a first external branch link that optically connects the first node to the optical signal source **(FIG. 15 (176-pre/post compensator) in which the pre/post compensator lies on an external branch link connecting transponders (178A,B)(optical signal sources) to the band multiplexer. NOTE: Tager's design is functionally equivalent to having an external branch link optically connected a node to the signal source, e.g. the left two sub band multiplexers (left of 180) and the band multiplexer (182) comprise a node; therefore, the right most sub band multiplexer (180) connects transponders-178A,B to the node via an external branch link. NOTE: 176-pre/post compensator is equally applicable to other nodes in optical system 164 (e.g. within Tager's TX/RX nodes-168B-D at 184 and 186 compensating devices))**; and

a signal dispersion pre-compensation means optically coupled to the first external branch link **(FIG. 15 (176,184,186-pre/post compensators) in which the pre/post compensators lie on an external branch link)**;

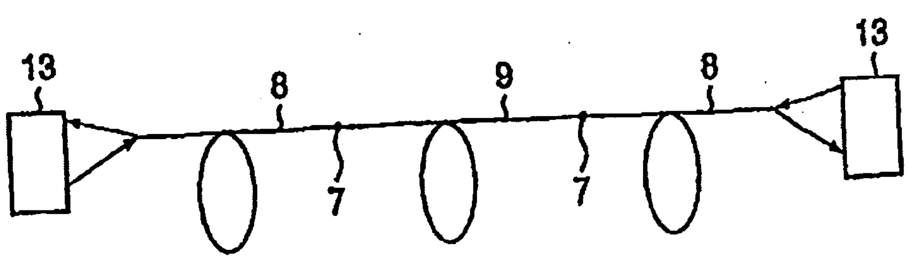
wherein the first and second signals are pre-compensated prior to entering the first node **(FIG. 15 (176-pre/post compensators, 178A,B-transponders) in which the signals from the transponders (first and second signals) are pre-compensated by pre-compensator-176 prior to entering the node (NODE: two left most sub band multiplexers and band multiplexer-182))**;

wherein the first signal is added at the first node, then transported to and dropped at the second node; and wherein the second signal is added at the first node,

then transported to and dropped at the third node **(FIG. 15 (178A,B-transponders) in which the first and second signals are added to the band multiplexer (182)(part of first node); furthermore, it is well known in the art that the switching node (170) receiving these signals is capable of dropping the first and seconds signals at different nodes, at a second node , at a third node))**.

Tager does not expressly disclose wherein at least one of the interconnecting links comprises a dispersion managed optical fiber span, the span comprising a plurality of optical fibers fused together serially, the plurality of optical fibers including first, second, and third optical fiber sections, the first optical fiber section having a dispersion of negative or positive sign at a wavelength, the second optical fiber section having a dispersion of opposite sign at the wavelength, and the third optical fiber section having a dispersion of like sign at the wavelength; wherein the first and second signals are pre-compensated by a substantially similar magnitude and with the same sign prior to entering the first node;

Fig. 5



Mukasa FIG. 5

Mukasa teaches wherein at least one of the interconnecting links comprises a dispersion managed optical fiber span **(Abstract and ¶0126,0014)**, the span comprising

a plurality of optical fibers fused together serially **(FIG. 5 (7-fused connection part) and ¶0077,0123-0124 in which the optical fibers are fused together via fused connection part)**, the plurality of optical fibers including first, second, and third optical fiber sections **(FIG. 5 (optical fiber sections 8,9,8) and ¶0079)**, the first optical fiber section having a dispersion of negative or positive sign at a wavelength **(FIG. 5 (8-first optical fiber) and ¶0079 in which the first optical fiber has a dispersion of positive sign)**, the second optical fiber section having a dispersion of opposite sign at the wavelength **(FIG. 5 (9-second optical fiber) and ¶0079 in which the second optical fiber has a dispersion of opposite sign (e.g. negative))**, and the third optical fiber section having a dispersion of like sign at the wavelength **(FIG. 5 (8-third optical fiber) in which the third optical fiber has a dispersion of like sign (e.g. positive))**.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager's line compensation (FIG. 15 (172)) and incorporate Mukasa's teachings of a dispersion manage link including both positive and negative net link dispersion. The motivation being that this allows the system to control distortion due to non-linear phenomenon and due to dispersion as taught by Mukasa ¶0126 and Abstract, which is a common problem in optical networks.

Tager in view of Mukasa does not expressly disclose wherein the first and second signals are pre-compensated <u>by a substantially similar magnitude and with the same sign</u> prior to entering the first node.

Hayee teaches wherein the first and second signals are pre-compensated by a substantially similar magnitude and with the same sign prior to entering the first node

(col3 ¶6 and FIG. 2a in which optical channels 1 and 2 are pre-compensated by similar magnitude and the same sign (e.g. DSF+: channels 1 and 2 in which their magnitudes are pre-compensated at approx. 80% with positive dispersion shifted fibers (same sign)));

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager in view of Mukasa and incorporate Hayee's teachings of pre-compensated signals by using similar magnitude and same sign. The motivation being that this helps minimize the effects of SPM as taught by Hayee col3 ¶6; thereby, reducing degradation of the optical signal. NOTE: Hayee's further teaches the use of pre and/or post compensation in combination with a dispersion managed link in order to help further compensate for nonlinearities as taught by Hayee col5 ¶8. Therefore, providing further motivation for incorporate Hayee's teachings into Tager in view of Mukasa.

Regarding claim 1, rejected as stated in claim 17 apparatus rejection.

Regarding claim 2, Tager in view of Mukasa in further view of Hayee disclose the method of claim 1 as applied above.

Tager further discloses wherein the first and second optical signals are produced at a common source location **(FIG. 15 (178A,B-first and second transponders) in which the first and second transponders are located at a common source location (e.g. common source location includes both transponders and sub band multiplexer (180)))**.

Regarding claim 3, Tager in view of Hayee disclose the method of claim 1 as applied above.

Tager further disclose wherein the first and second optical signals are produced at different source locations **(FIG. 15 (178A,B-first and second transponders) in which the first and second transponders are located at different source locations (e.g. first and second signals are produced by separate transponders; therefore, are located at different locations))**.

Claims 4-7 addressed below.

Regarding claim 8, rejected as stated in claim 2 rejection.

Claims 9-10 addressed below.

Regarding claim 11, rejected as stated in claim 17 apparatus rejection in which optical signals are pre- and post-compensated.

Regarding claim 12, rejected as stated in claim 17 apparatus rejection in which the first and second signals are pre-compensating before entering a first node (before dropping the signals).

Claims 13-17 addressed below.

Regarding claim 20-21, rejected as stated in claim 18 in which Tager further discloses in FIG. 12 and ¶0040-0042 how to calculate/design a fiber span to meet a target value for of per span dispersion; therefore, it is a matter of design choice to have the residual dispersion be greater than or less than 10 ps/nm, e.g. calculating the residual dispersion to be a value greater than 10ps/nm is within the scope of Tager's invention.

Regarding claim 22, rejected as stated in claim 17 in which Tager discloses to pre-compensate the signals by a certain amount based on the target dispersion (e.g. ¶0042 in which the signals are pre-compensated by 600ps/nm); therefore, it is a matter of design choice to pre-compensate the first and second signal within 50 ps/nm of each other in order to meet the targeted dispersion value.

Regarding claim 23, Tager in view of Hayee disclose the method of claim 17 as applied above.

Tager further discloses wherein at least one signal enters a first node **(FIG. 1 (102B-end node) and ¶0029 in the a signal enters the optical system through end node-102B (first node))**, transits through a second node **(FIG. 1 (102D-end node) and ¶0029 in which the signal is transmitted through end node-102D (second node))**, and is dropped at a third node **(FIG. 1 (104B-switch node) and ¶0029 in which the signal is received (dropped) at switch node-104B (third node))**.

Claims 24-25 addressed below.

Regarding claim 26, Tager discloses an optical communications system **(FIG. 15 and ¶0050)** comprising:

a first optical signal source capable of generating a plurality of signals at a plurality of wavelengths including a first signal **(FIG. 15. (Transponders-178A, 178B) and ¶0050 in which the transponders (first optical signal source) generate individual wavelengths for transmission (plurality of signals at a plurality of wavelengths))**;

a second optical signal source capable of generating a plurality of signals at a plurality of wavelengths including a second signal **(FIG. 15. (Transponders) and ¶0050 in which the transponders at another node (second optical signal source) generate individual wavelengths for transmission (plurality of signals at a plurality of wavelengths))**;

a plurality of nodes including first, second and third nodes **(FIG. 15)**; and

a plurality of optical fiber links including: interconnecting links that optically interconnect the plurality of nodes **(FIG. 15 and ¶0050 in which the optical nodes (168A-D) are interconnected via a plurality of fibers)**:

external branch links, each external branch link optically connected to at least one of the nodes **(FIG 15 in which the external branch links describe above are optically connected to their respective nodes)**, including:

a first external branch link that optically connects the first node to the first optical signal source **(FIG 15 and ¶0050 in which 184 lies on a first external branch link that optically connects the first node (2 left most sub band multiplexers and band multiplexer-182) to transponders 178A,B (first optical signal source))**; a second external branch link that optically connects the second node to the second optical signal source **(FIG 15 and ¶0050 in which 176 lies on a second external branch link that optically connects the second node (2 bottom most sub band multiplexers and band multiplexer) to the two top most transponders (second optical signal source)**; and a third external branch link optically connected to the third node **(FIG 15 and ¶0050 in which 186 lies on a third external branch link that optically connects**

the third node (2 bottom most sub band multiplexers and band multiplexer) to the two top most transponders (third optical signal source); wherein the first signal is added at the first node , then transported to and dropped at the third node **(FIG. 15 and ¶0050 in which the second signal is added to the first node; furthermore, it is well know in the art that an optical switching node (170) is able to transfer the received first signal to any other node in optical system-164 (e.g. the first signal is received (dropped) by the third node))**; wherein the second signal is added at the second node, then transported to and dropped at the third node **(FIG. 15 and ¶0050 in which the second signal is added to the second node; furthermore, it is well know in the art that an optical switching node (170) is able to transfer the received second signal to any other node in optical system-164 (e.g. the second signal is received (dropped) by the third node))**; and wherein the third external branch link includes signal dispersion post compensation means for post-compensating the first and second signals with dispersion post-compensation **(FIG. 15 (176-pre/post compensator) and ¶0050 in which the pre/post compensators lie on the second external branch link. NOTE: 184-dispersion compensating measure and 186-complementry measure are functionally equivalent to pre/post compensators (e.g each compensate dispersion in transmitted (pre-)/received (post-) optical signals on their respective external branch links))**.

Tager does not expressly disclose wherein at least one of the interconnecting links comprises a dispersion managed optical fiber span, and the span comprising a plurality of optical fibers fused together serially, the plurality of optical fibers including

first, second, and third optical fiber sections, the first optical fiber section having a dispersion of negative or positive sign at a wavelength, the second optical fiber section having a dispersion of opposite sign at the wavelength, and the third optical fiber section having a dispersion of like sign at the wavelength; wherein the third external branch link includes signal dispersion post compensation means for post-compensating the first and second signals with dispersion post-compensation of <u>substantially similar magnitude and of the same sign</u>.

Mukasa teaches wherein at least one of the interconnecting links comprises a dispersion managed optical fiber span **(Abstract and ¶0126,0014)**, and the span comprising a plurality of optical fibers fused together serially **(FIG. 5 (7-fused connection part) and ¶0077,0123-0124 in which the optical fibers are fused together via fused connection part)**, the plurality of optical fibers including first, second, and third optical fiber sections **(FIG. 5 (optical fiber sections 8,9,8) and ¶0079)**, the first optical fiber section having a dispersion of negative or positive sign at a wavelength **(FIG. 5 (8-first optical fiber) and ¶0079 in which the first optical fiber has a dispersion of positive sign)**, the second optical fiber section having a dispersion of opposite sign at the wavelength **(FIG. 5 (9-second optical fiber) and ¶0079 in which the second optical fiber has a dispersion of opposite sign (e.g. negative))**, and the third optical fiber section having a dispersion of like sign at the wavelength **(FIG. 5 (8-third optical fiber) in which the third optical fiber has a dispersion of like sign (e.g. positive))**.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager's line compensation (FIG. 15 (172)) and incorporate Mukasa's teachings of a dispersion manage link including both positive and negative net link dispersion. The motivation being that this allows the system to control distortion due to non-linear phenomenon and due to dispersion as taught by Mukasa ¶0126 and Abstract, which is a common problem in optical networks.

Tager in view of Mukasa does not expressly disclose wherein the third external branch link includes signal dispersion post compensation means for post-compensating the first and second signals with dispersion post-compensation of <u>substantially similar magnitude and of the same sign</u>.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager's line compensation (FIG. 15 (172)) and incorporate Mukasa's teachings of a dispersion manage link including both positive and negative net link dispersion. The motivation being that this allows the system to control distortion due to non-linear phenomenon and due to dispersion as taught by Mukasa ¶0126 and Abstract, which is a common problem in optical networks.

Hayee teaches wherein the third external branch link includes signal dispersion post compensation means for post-compensating the first and second signals with dispersion post-compensation of <u>substantially similar magnitude and of the same sign</u>. **(col3 ¶6 and FIG. 2b in which optical channels 4 and 5 are post-compensated by similar magnitude and the same sign (e.g. DSF-: channels 4 and 5 in which their**

magnitudes are post-compensated by approx. 95% with negative dispersion shifted fibers (same sign))).

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager in view of Mukasa and incorporate Hayee's teachings of pre-compensated signals by using similar magnitude and same sign. The motivation being that this helps minimize the effects of SPM as taught by Hayee col3 ¶6; thereby, reducing degradation of the optical signal. NOTE: Hayee's further teaches the use of pre and/or post compensation in combination with a dispersion managed link in order to help further compensate for nonlinearities as taught by Hayee col5 ¶8. Therefore, providing further motivation for incorporate Hayee's teachings into Tager in view of Mukasa.

Regarding claim 27, Tager discloses the method of claim 26 as applied above.

Tager in view of Mukasa does not expressly disclose wherein greater than 50% of the dropped signals are each post-compensated by a substantially similar magnitude and with the same sign.

Hayee teaches wherein greater than 50% of the dropped signals are each post-compensated by a substantially similar magnitude and with the same sign **(col3 ¶6 and FIG. 2b in which all optical channels (100% of the received/dropped signals) are post-compensated by similar magnitude and the same sign (e.g. DSF-: channels 1-8, in which their magnitudes are post-compensated by approx. 95% with negative dispersion shifted fibers (same sign))).**

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Tager in view of Mukasa and incorporate Hayee's teachings of post compensating over 50% of the dropped signal by substantially similar magnitude. The motivation being that this allows the optimal distortion compensation of the drop signals; thereby, allowing for "cleaner" optical signals to be received, e.g less errors, better BER, SNR, etc....

Regarding claim 4-5, rejected as stated in claim 26 rejection.

Regarding claims 6-7, rejected as stated in claim 27 rejection.

Regarding claim 9, rejected as stated in claim 2 (common source location rejection) and claim 27 rejection (greater than 50% pre-compensation rejection).

Regarding claim 10, Tager in view of Mukasa in further view of Hayee disclose the method of claim 1 as applied above.

Tager further discloses wherein the first and second signals temporally overlap **(¶0042 in which it is well known in the art that pre-compensating signals by a large amount (e.g. by 600 ps/nm) will cause the two signal pulses to broaden and temporally overlap as they enter the optical system)**.

Regarding claim 13-16, are rejected as stated in claim 27 rejection in which all the signals received are post compensated.

Regarding claim 24, rejected as stated in claim 27 apparatus rejection.

Regarding claim 25, rejected as stated in claim 26 apparatus rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luis F. Garcia whose telephone number is (571)272-7975. The examiner can normally be reached on 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken N. Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LG

SUPERVISORY PATENT EXAMINER